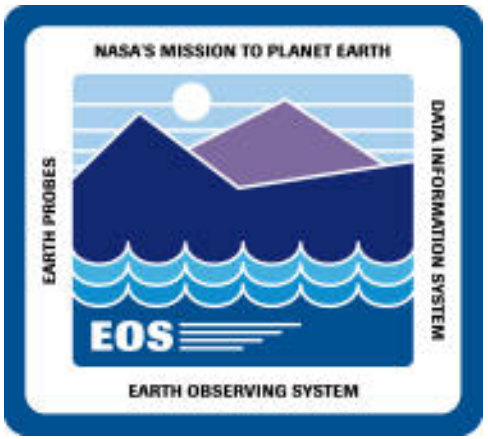

Failure Injection and Recovery

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21 February 1996

Agenda

- **Objectives**
- **Model Capabilities**
- **Methodology**
- **Experimental Design**
- **Results/Analysis**
- **Future Studies**
- **Conclusion**

Objectives

To Assess the System Performance impact under reduced Resource availability

Processing Subsystem CPU Failure

- **Job Turnaround**

Objectives (Continue)

Assist in System Sizing/Capacity Planning

- To meet the response time/throughput Requirement
- To perform “What If” Analysis under failure/recovery mode

Model Capabilities

What's Currently Implemented in ECS Dynamic Model

Single/Multiple Hardware Failure injection/Recovery

Processing Subsystem

- **CPU Failure/Recovery**

Data Server Subsystem

- **Robotic**

Methodology

A Generic Parameter Driven Model Design to perform failure/recovery Analysis

Parameters needed for CPU failure:

- **Failure Injection time**
- **DAAC ID, String ID and Number of (CPU) resources to be failed**

Parameters needed for Data Server component failure:

- **Failure Injection time**
- **DAAC ID, String ID, Number of (Robots and/or R/W Heads) Resources to be failed**

Methodology (continue)

A Generic Parameter Driven Model Design to perform failure/recovery Analysis

Parameters needed for CPU recovery:

- **Recovery time**
- **DAAC ID, String ID and Number of (CPU) resources to be recovered**

Parameters needed for Data Server component recovery:

- **Recovery time**
- **DAAC ID, String ID, Number of (Robots and/or R/W Heads) Resources to be recovered.**

Experimental Design

Model Scenarios

Two Runs with identical workload

(1) Normal Run

- **LaRC for CERES-TRMM workload with two shift (16 Hrs) operation (8:00 A.M. to 12 Midnight) for product generation, with 24 SGI/PC**
- **Simulation started on day 27**
- **Simulation duration for 17 days (27+17=44)**

(2) Failure/Recovery Run

- **Same conditions as above except CPU failure injected on day 33 at 8:00 A.M. (all CPUs down for 8 hours) and Recovery process started at 4:00 P.M.**

Results/Analysis

Side by Side comparison of these two runs

- **CPU allocation Timeline, Jobs Queue timeline, Processing Disk allocation Timeline**
- **Expected Vs Achieved Process frequency**
- **Products Processing Time (mean, min., Max)**
- **Production Process History (Start/Finish time)**
- **Data Server Disk Allocation Timeline**
- **Data Server R/W Heads allocation Timeline, R/W heads Requests queuing**
- **Data Server Robotic allocation Timeline, Requests queuing at Robotics**

Future Studies

The current analysis indicates the following studies may be interesting and worthwhile.

- **AM1 Instruments Failure/Recovery Analysis (MODIS, ASTER, CERES AM and MISR) in terms of**

  (1) CPU failure at Processing subsystem

  (2) Robotic failure at Data Server subsystem

  (3) R/W Heads failure at Data Server subsystem

  (4) Ingest subsystem (Robotic and/or Read/write heads failure/recovery for AM1 instruments

Conclusion

Failure/Recovery analysis currently limited to Processing Subsystem and Data Server Subsystem

ECS Dynamic Model (BONeS) design may be enhanced if require to support

- **Ingest subsystem failure/recovery analysis**